

ANNUAL REPORT FOR 2000



Bridge Maintenance Mitigation Site

New Hanover County

Project No. 8.2250109

TIP No. U-92 WM



Prepared By:
Natural Systems Unit & Roadside Environmental Unit
North Carolina Department of Transportation
December 2000

TABLE OF CONTENTS

SUMMARY	1
1.0 INTRODUCTION	2
1.1 Project Description	2
1.2 Purpose	2
1.3 Project History	2
2.0 HYDROLOGY	4
2.1 Success Criteria	4
2.2 Hydrologic Description	4
2.3 Results of Hydrologic Monitoring	6
2.3.1 Site Data	6
2.3.2 Climatic Data	6
2.4 Conclusions	6
3.0 VEGETATION	8
3.1A Success Criteria (Bald Cypress Area)	8
3.1B Success Criteria (Marsh Grass Area)	8
3.2 Description of Planted Areas	8
3.3A Results of Vegetation Monitoring (Bald Cypress Area)	8
3.3B Results of Vegetation Monitoring (Marsh Grass Area)	9
3.4A Conclusions (Bald Cypress Area)	11
3.4B Conclusions (Marsh Grass Area)	11
4.0 OVERALL CONCLUSIONS/ RECOMMENDATIONS	11

FIGURES

Figure 1. Site Location Map	3
Figure 2. Monitoring Well Location Map	5
Figure 3. 30-70 Percentile Graph	7
Figure 4. Vegetation Plot and Photo Locations Map	12

APPENDICES

Appendix A Surface Water Depth Plot.....	14
Appendix B Site Photos	16

SUMMARY

The following report summarizes the monitoring activities that have occurred in 2000 at the Bridge Maintenance Mitigation Site, representing the first year of monitoring of the Phase One section.

This site will be constructed in two phases. Phase One, which will encompass the majority of the site (5.76 acres), involved grading and planting up to the right-of-way limits for the proposed Section A of the Smith Creek Parkway. Phase Two will involve the remainder of the site (0.63 acre) inside the right-of-way boundary up to approximately ten feet outside of the fill slope, and will be completed during construction of Section A of the Smith Creek Parkway.

The site is equipped with 1 surface gauge. Due to the fact that this is a tide-driven system, groundwater and rain gauges were not installed. The surface gauge was installed on July 20, 2000, and showed that the site was inundated on a daily basis for the entire time it was operational.

Due to changes in the hydrology of Smith Creek over the last decade and subsequent decline in natural bald cypress populations, it is uncertain if the planted bald cypress trees will survive. Therefore, through consultation with the Corps, it was decided that the planted bald cypress would be monitored to track survival, but there would be no success criterion for tree survival for this site. Two tree monitoring plots and eighty-five herbaceous vegetation monitoring plots are located on the site. As expected for the first monitoring year, herbaceous vegetative coverage does not meet the success criteria; however, it has significantly increased since planting. The percent frequency of target species exceeds the required 70%.

Based on monitoring results of 2000, NCDOT recommends that monitoring continue on this site.

1.0 Introduction

1.1 Project Description

The Bridge Maintenance Mitigation Site is located in New Hanover County, adjacent to Smith Creek and the U-92A project in Wilmington (Figure 1). Totalling 6.4 acres in size, the site provides compensatory mitigation for a portion of the wetland impacts associated with U-92C. Phase One of the site (5.76 acres) has been constructed and planted, and Phase Two will be constructed concurrent with construction of U-92A. The site consists of tidal Cypress-Gum Swamp Forest restoration, and contains a system of swales to facilitate drainage as the tide goes out and help prevent ponding.

1.2 Purpose

In order to demonstrate successful mitigation, the Bridge Maintenance site is monitored for both hydrology and vegetation. 2000 marks the first year of monitoring for the site. The following report describes the results of both hydrologic and vegetation monitoring for 2000.

1.3 Project History

March- May 2000	Site Constructed – Phase 1
May 2000	Site Planted – Phase 1
July 2000	Surfacewater Gauge Installed
July- December 2000	Hydrologic Monitoring
August 2000	Vegetation Monitoring – Phase 1 (1 yr.)

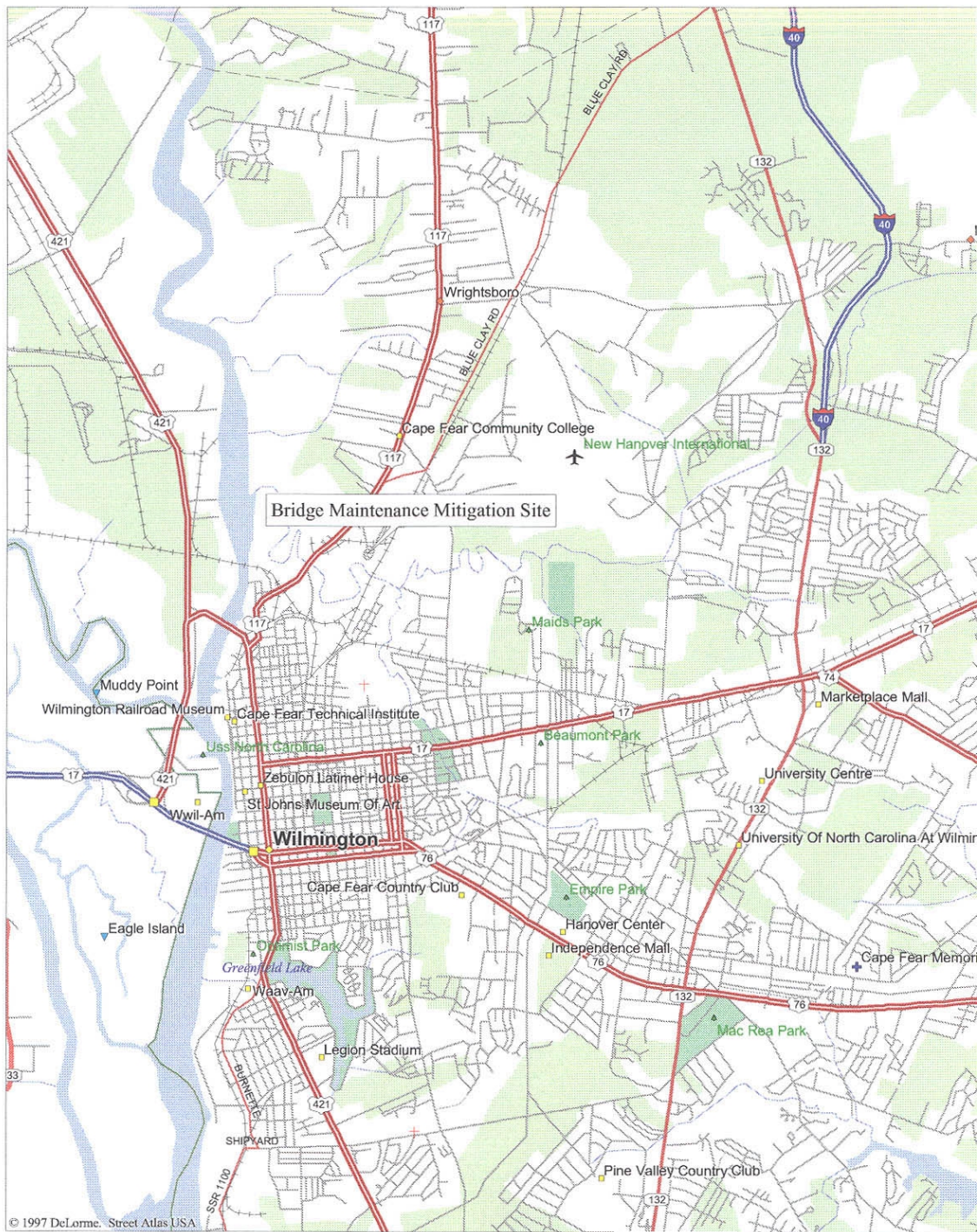


FIGURE 1. Site Location Map

2.0 Hydrology

2.1 Success Criteria

Because this is a tidal system, groundwater monitoring is not required at this site. Instead, data from an on-site tide gauge (collected 10-10-96 through 11-21-97) was used to estimate the percent of time the site would remain flooded, at specific elevations. A target elevation of 2.5 feet above mean sea level was selected based on elevations of desired vegetation communities at the adjacent proposed Smith Creek Mitigation Site. Using the '96/'97 data, it was calculated that this would result in the site being inundated 37% of the time.

However, prior to construction, it was decided that an elevation of 2.5 feet was too high, based on the elevation of the adjacent wetland to the east. An on-site meeting was held with the Corps of Engineers in January 2000 to discuss this issue. They agreed that lowering the proposed grade to an elevation of approximately 1.0 foot above mean sea level at the edge of the creek (match existing mudflat) and then gradually sloping up to an elevation of approximately 1.8 feet above mean sea level at the upper edge of the site would be acceptable.

Revised calculations of the inundation time, based on the '96/'97 data, yielded a result of 56% for the proposed average elevation of the site (1.4 feet).

Therefore, the site will be considered hydrologically successful if it is inundated 56% of the time.

2.2 Hydrologic Description

One 40-inch surface gauge, set to record hourly readings, was installed in July of 2000 (Figure 2). The elevation of the calibration point of the gauge was located using survey equipment, and was found to be at 33 inches above sea level. On November 6, 2000, the gauge was raised 12 inches on the pole to avoid being submerged during high water.

Appendix A contains a plot of the water depth for the surface gauge. Monitoring results are shown from the day the well was installed (July 20, 2000) to the most recent download (December 7, 2000). The actual average elevation across the site (14.3 inches) is also shown on this graph, calculated from elevation data taken on the same day that the elevation of the surface water gauge calibration point was determined.

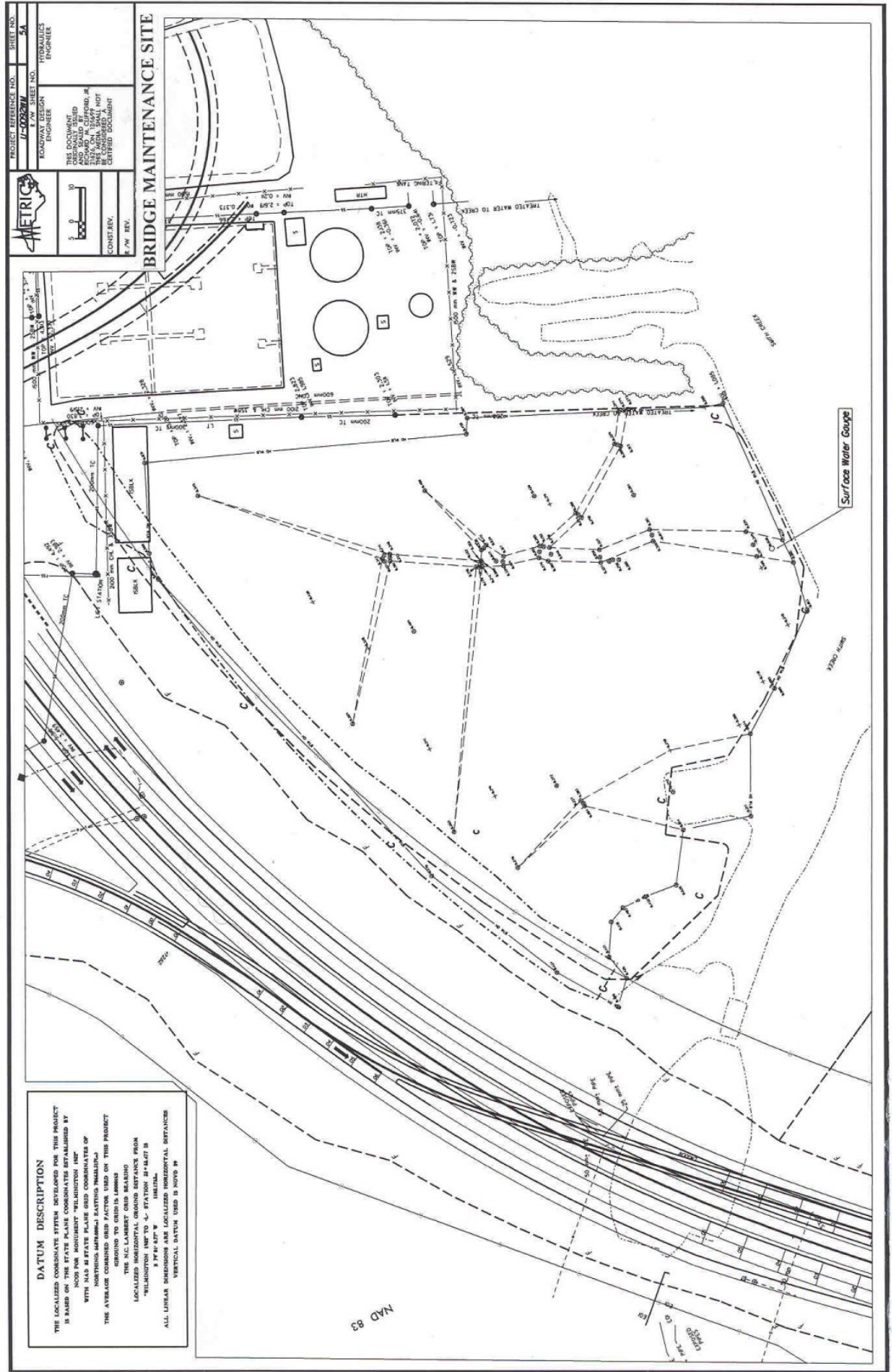


FIGURE 2. Surface Gauge Location Map

2.3 Results of Hydrologic Monitoring

2.3.1 Site Data

The surface water gauge on the site recorded water levels greater than the actual average site elevation (14.3 inches above sea level) for 57.7% of the monitoring period (July through December, excluding missing data intervals).

2.3.2 Climatic Data

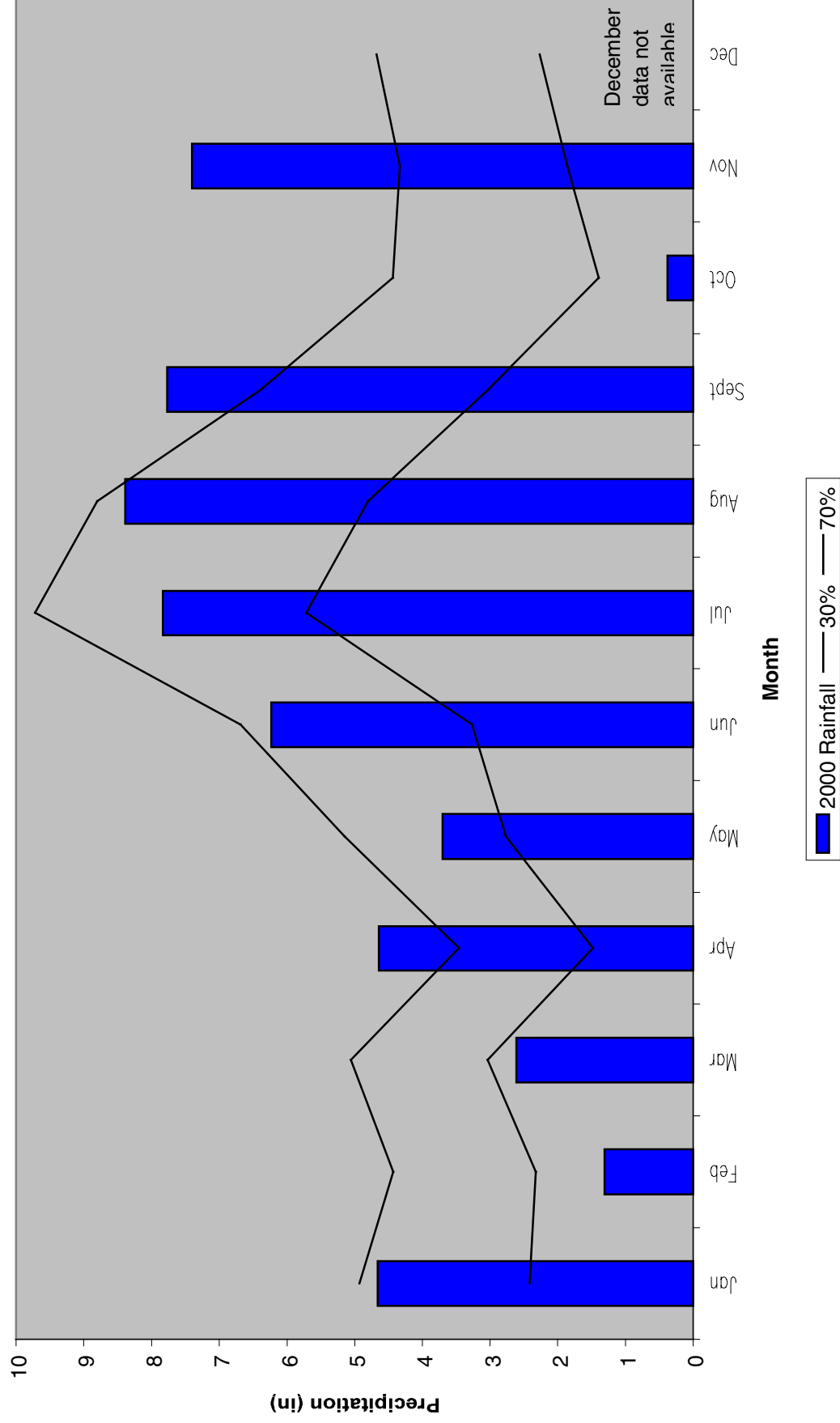
Figure 3 represents an examination of the local climate in comparison with historical data to determine if 2000 rainfall falls within the normal rainfall range of the area. The historical data was provided by the National Climatic Data Center; the recent rainfall data was provided by the State Climate Office at NC State University, from the station at the Wilmington International Airport.

February, March and October were the only months with below normal rainfall for the Wilmington area. Monthly rainfall totals for the majority of the growing season were within the normal monthly range.

2.4 Conclusions

The Bridge Maintenance Mitigation Site met the hydrologic success criterion during the portion of 2000 for which it was monitored.

**Figure 3. Bridge Maintenance 30 - 70 Percentile Graph
Wilmington, NC**



3.0 Vegetation: Bridge Maintenance Mitigation Site (Year 1 Of 5)

3.1A Success Criteria (Bald Cypress Area)

As stated above, there is no success criterion for the bald cypress planted. However two 100' x 100' plots have been set and will be counted as part of the vegetation monitoring for the site.

3.1B Success Criteria (Marsh Grass Area)

The vegetative marsh success of the wetland site will be determined in accordance with NMFS Guidelines. Monitoring plots found to be located within the open water channel will not be evaluated, and will not count to the final count of plots. The vegetation component of the wetland site will be deemed successful if the following criteria are met:

1. At year five, the average of all plots should have a scale value of 5 (75% vegetative cover) consisting of wetland herbaceous species, not including any invasive species.
2. A minimum of 70% of the plots shall contain the target (planted) species.

3.2A & B Description of Planted Areas

The following plant communities were planted throughout the Bridge Maintenance Site:

Approximately 5.7 acres

Spartina cynosuroides, big cordgrass

Spartina alterniflora, smooth cordgrass

Cladium jamaicense, sawgrass

Taxodium distichum, bald cypress

3.3A Results of Vegetation Monitoring (Bald Cypress Area)

Plot #	Bald Cypress
1	26
2	15

3.3B Results of Vegetation Monitoring (Marsh Grass Area)

ZONE	Plot #	Scale Factor	<i>S. cynosuroides</i>	<i>S. alterniflora</i>	Sawgrass	Frequency	Notes
1	1	0.0		✓		✓	OPEN WATER
	2	3.0		✓		✓	
	3	0.5	✓			✓	
	4	0.5	✓			✓	
	5	0.5			✓	✓	
	6	2.0	✓		✓	✓	
	7	2.0		✓	✓	✓	
	8	2.0	✓		✓	✓	
	9	3.0		✓		✓	
	10	1.0	✓		✓	✓	
	11	2.0		✓		✓	
	12	0.0					
	13	2.0	✓		✓	✓	
	14	2.0		✓		✓	
	15	4.0		✓		✓	
	16	0.0					
	17	0.1			✓	✓	
	18	0.5			✓	✓	
	19	0.1			✓	✓	
	20	2.0		✓	✓	✓	
	21	2.0		✓		✓	
	22	2.0		✓	✓	✓	
	23	2.0	✓			✓	
	24	0.0					
	25	2.0		✓		✓	
	26	0.0					
	27	3.0		✓		✓	
	28	0.5	✓		✓	✓	
	29	0.5			✓	✓	
	30	0.0					
	31	0.5	✓		✓	✓	
	32	2.0	✓			✓	
	33	2.0		✓		✓	
	34	2.0		✓		✓	
	35	0.0					
	36	1.0			✓	✓	
	37	2.0		✓	✓	✓	
	38	0.5			✓	✓	
	39	2.0	✓		✓	✓	
	40	2.0		✓	✓	✓	
	41	1.0			✓	✓	
	42	2.0		✓		✓	
	43	1.0	✓		✓	✓	
	44	0.5	✓			✓	
	45	0.0					

Site Notes: The marsh grasses are present throughout site. Coverage has increased since planting. A few *Sagittaria latifolia* “lance-leaved sagittaria” or “duck potato” are on site. 59 plots contain cattails (not included in percent coverage). Seven plots contain *Juncus* species.

3.4A Conclusions (Bald Cypress Area)

Bald cypress was planted on 20' centers throughout the approximately 5.7 acre site. Two 100' x 100' plots were established in the planting area (Figure 4). The vegetation monitoring of the planted area revealed **41** bald cypress trees counted within the plots. There is no success criterion to meet on this portion of the project.

3.4B Conclusions (Marsh Grass Area)

- Percent Frequency of Target Species
(big cordgrass, smooth cordgrass, sawgrass) **86.9%**
Frequency of 70% required.
- Vegetative Cover Scale Value **1.3**
Scale Value of 5 required for year 5.

Approximately 5.7 acres of this site involves marsh grass plantings. As expected for the first monitoring year, vegetative coverage does not meet the success criteria; however, it has significantly increased since planting. The percent frequency of target species exceeds the required 70%.

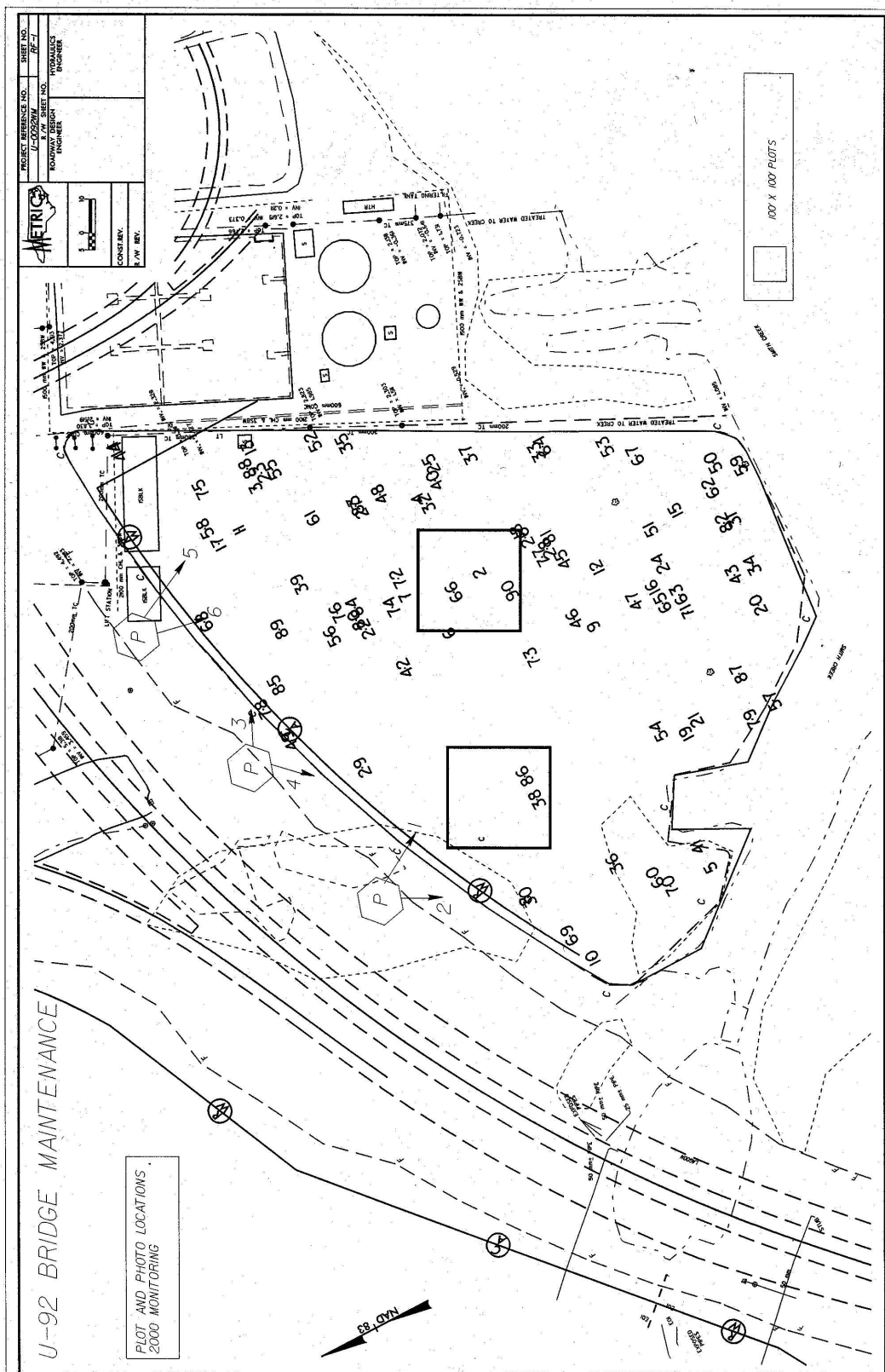


Figure 4: Vegetation Plot and Photo Locations

4.0 OVERALL CONCLUSIONS/ RECOMMENDATIONS

During the first year of monitoring, the Bridge Maintenance Site (Phase One) was inundated on a daily basis for the entire time it was operational. The site met the hydrologic success criterion, since it was inundated 57.7% of the monitoring period.

Although there is no success criterion for cypress survival on this site, 41 live trees were observed in the two tree monitoring plots. As expected for the first monitoring year, herbaceous vegetative coverage does not meet the success criteria; however, it has significantly increased since planting. The percent frequency of target species exceeds the required 70%.

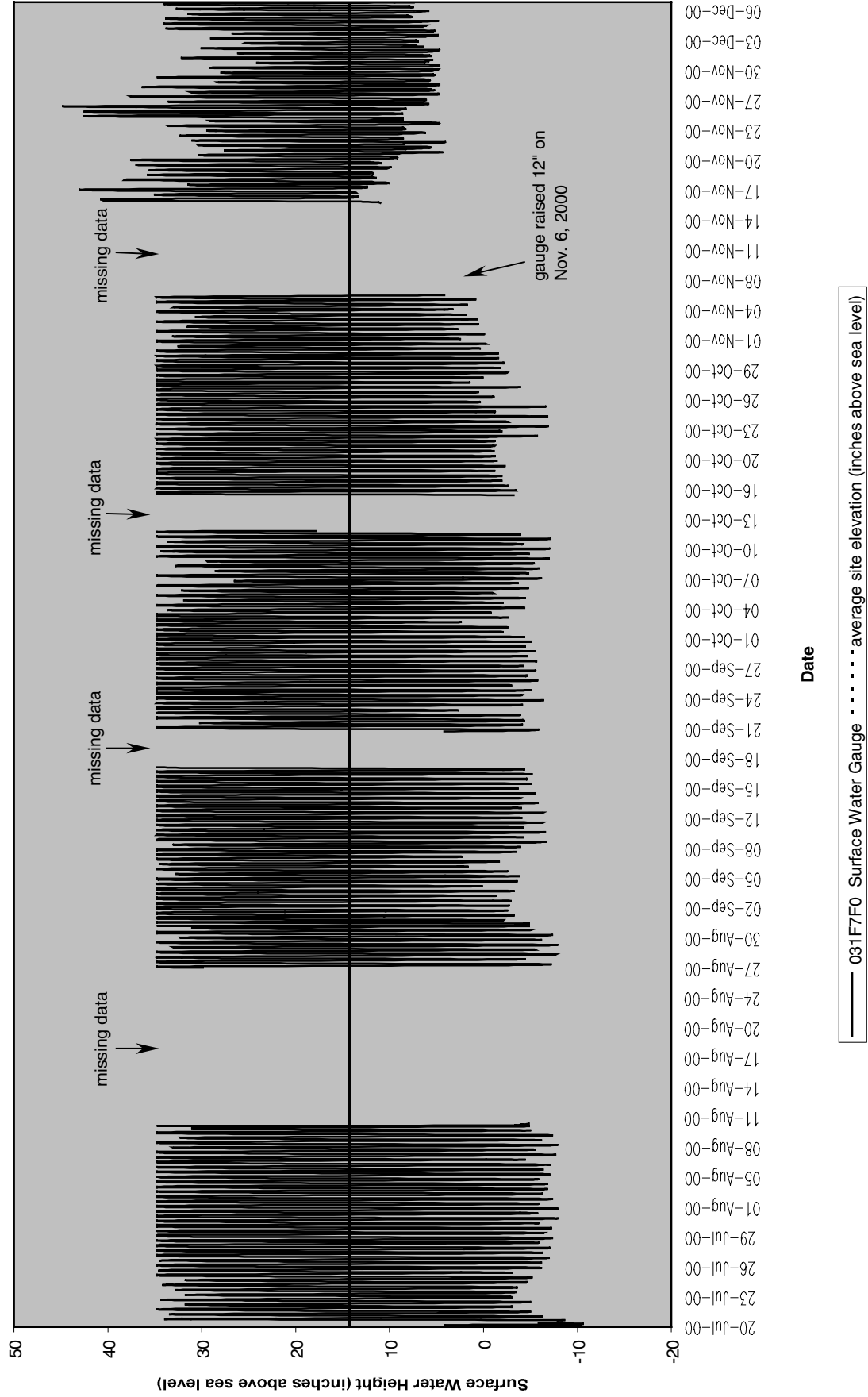
There is also evidence that the site is functioning to increase wildlife habitat in the area. At various times during the summer of 2000, many species were observed using the area, including fiddler crabs, blue crabs, various shorebirds and wading birds, turtles, alligators, and insects. There are also naturally-germinated cypress seedlings along the upper edge of the site.

Based on monitoring results of 2000, NCDOT recommends that monitoring continue on this site.

APPENDIX A

SURFACE WATER DEPTH PLOT

Bridge Maintenance Surface Gauge



APPENDIX B

SITE PHOTOS

U-92 Bridge Maintenance



Photo 1



Photo 2



Photo 3



Photo 4



Photo 5



Photo 6